White Paper: Homeland Security

Issue

Counterterrorism problems are complex, multi-dimensional problems that will not be solved quickly. Technological superiority with long-term investments played a critical role in winning the Cold War. Strategic thinking around the right approach for this new war on terrorism is needed.

Background

Since the Manhattan Project, the nation has relied on the U.S. Dept. of Energy (DOE) national labs to ensure proper stewardship of the nuclear-weapons stockpile. In response to 9/11, Congress passed legislation, in Section 309 of the 2002 Homeland Security Act, authorizing the DOE national laboratories to work with the Dept. of Homeland Security to help the agency fulfill its mission.

The national labs have been leveraging relevant expertise, capabilities, and facilities derived from our nuclear heritage and the large portfolio of work for other national security agencies. This has enabled them to provide the U.S. with great value in securing our society through effective deployment and use of science, technology and systems solutions.

The DOE national labs have particular expertise and culture to help the nation design, develop and implement risk-based systems solutions for high-consequence homeland security threats and national incidents. They are committed to making enduring and effective contributions to homeland security at the highest levels.

Challenges

- **The potential use of weapons of mass destruction (WMD) requires a similar level of diligence and enduring vigilance to that needed for the nuclear stockpile.**
- Since 9/11, America has aptly emphasized deploying near-term solutions to perceived critical threats. Now it is appropriate to mature the US approach to homeland security and **increase emphasis on establishing a comprehensive, longer-term, systematic and strategic approach.**
- The federal government needs to ensure it stewards relevant homeland security skills, capabilities, and facilities along with difficult-to-advance high-risk, high-reward concepts that take time to mature.

Recommendations

- **Establish a relevant risk-based, long-term national strategy and investment** in homeland security R&D.
- **Maintain national vigilance to address high-consequence, low-probability threats** posed by WMD.
- **Ensure societal resiliency** to future attacks by addressing response and recovery levels and use.
- **Encourage the use of systems analysis,** tools and methodologies to guide development and engineering solutions that operate effectively in complex and dynamic conditions.
- **Develop robust processes to transition promising R&D** concepts into operation.
- **Perform a comprehensive review of different governance structures** to determine the best ways to integrate the national R&D community – academia, industry, and national labs.

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Possible Solutions

Sufficient long-term investment should be made for the U.S. to have the sustained and knowledgeable science and technology workforce, and appropriate facilities to address homeland threats.

Because securing the homeland is so complex and the threats are adaptive, a systems approach to homeland security is needed. Systems analysis methods fully explore the context in which a technology will be used. Continued investment in risk-based approaches and systems-level solutions are required to minimize costs. People and institutions with deep knowledge as well as independence should perform these analyses.

Transitioning R&D into operations has unique aspects for homeland security. It is essential that a robust process be developed that recognizes agreements with federal, state, local and tribal agencies, while also considering end-user operational requirements, privacy provisions, and free commerce.

The R&D strategy may include advancing:

1. *Countermeasures technologies* to address WMD, weapons of mass disruption (cyber/ information and explosives), intruder threats, and technologies aimed at multiple threat modalities.
2. *Human factors methods and tools* to better understand the motivations and behavior of people, groups and radical movements through advanced technologies and analysis.
3. *Risk management technologies and systems* to provide increased resiliency to border threats, protect critical infrastructure, and provide sophisticated analyses, management, and responses.
4. *Intrinsic security and infrastructure assurance technologies* to address complex systems and systems-of-systems.
5. *Information management (classified to public-release)* to address three critical elements: a framework, a process for public/private sharing, and a policy/approach to communicate with the public and stakeholders.

What Is Needed

- ✓ Implement risk-based, long-term national strategy and investment in homeland security R&D.
- ✓ Increase the ability to anticipate threats as they adapt, continuously assessing potentially emerging vulnerabilities.
- ✓ Balance ongoing vigilance addressing high-consequence, low-probability WMD threats with continuous societal resilience to likely future attacks.
- ✓ Leverage and draw from the invaluable brain-trust of existing R&D capabilities in the U.S. (from universities, national labs, and industry).

Possible Roles for Homeland Security R&D Community

Each element of the national R&D community provides particular value to homeland security R&D. It is imperative that the U.S. effectively uses and appropriately supports each element. Academia typically generates open, peer-reviewed focused basic research. Industry mainly produces proprietary prototypes and products. Government national security labs:

- **Provide classified threat analysis** and associated technology development, anticipatory research for complex problems, independent technical analysis and advice to help the U.S. make wise investment decisions in large-scale acquisitions
- **Provide government-owned independent systems engineering** and test & evaluation expertise for large-scale system deployments to protect the homeland
- **Provide comprehensive WMD expertise & capabilities** to address chemical, biological, radiological, nuclear, and explosive threats
- **Provide advanced expertise and technologies to protect against weapons of mass disruption** (explosives or cyber threats) that could provoke less-destructive, high-consequence events
- **Help the U.S. design, develop and implement risk-based systems solutions** for high-consequence homeland security threats and national incidents

Conclusion

For the national R&D community to fulfill their homeland security roles, various governance structures should be explored, especially those taking into account stewardship and high-risk, high-reward research.

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